

Last Name (print) _____ First Name _____
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Exam2Sec2

True/False

Indicate whether the statement is true or false.

- ___ 1. Because of the dissolved salt in seawater its freezing point is higher than that of pure water
- ___ 2. Marcet's principle states that "regardless of how the salinity may vary from place to place the ratios between the amounts of the major ions in the waters of the open ocean are nearly constant"
- ___ 3. Hydrothermal chimneys are formed from lava at mid-ocean ridge hydrothermal vent sites.
- ___ 4. Hydrothermal vents always have large numbers of animals around them
- ___ 5. Iron is a chemical that is taken up by many organisms in the ocean because they need it for some biochemical processes
- ___ 6. There is more phosphate in the deep water of the Pacific Ocean than in the deep water of the Atlantic Ocean
- ___ 7. Tritium is a chemical that can be used to trace the physical movement of water in the oceans
- ___ 8. It doesn't matter what the salinity of the seawater is -- you can always make it dense enough to form deep water if you cool it enough
- ___ 9. Salinities in the open ocean can vary from 32-39
- ___ 10. Outgoing radiation from the Earth is longwave
- ___ 11. The Hadley cell is an atmospheric circulation cell that moves air between the Equator and 30°N
- ___ 12. The atmospheric pressure at the top of Mauna Kea is approximately 562 mb
- ___ 13. Surface currents are driven by thermohaline processes
- ___ 14. During El Nino conditions hurricanes are less likely to come near Hawaii
- ___ 15. When wind blows over cold ocean water it is less likely to produce rain than when it blows over warm water
- ___ 16. Wind waves are deep water waves
- ___ 17. Wave packets travel more slowly than individual waves
- ___ 18. The effect of the Sun on the generation of tides is about 45% of that of the Moon
- ___ 19. Atmospheric carbon dioxide levels are currently higher than they have been during the last 160,000 years
- ___ 20. During ice ages sea level goes up

Multiple Choice

Identify the choice that best completes the statement or answers the question.

- _____ 21. How much salt is dissolved in a kilogram of typical seawater
- 1 gram
 - 15 gram
 - 35 gram
 - 1000 gram
 - 0.1 gram
- _____ 22. What is the approximate mixing time of the oceans?
- 100 years
 - 1,000 years
 - 36,000 years
 - 1 million years
- _____ 23. Most of the chemicals in seawater come from
- hydrothermal vents
 - rivers
 - rain
 - phytoplankton
- _____ 24. The source of energy for life around hydrothermal vents is:
- Photosynthesis
 - Chemosynthesis
 - Hydrostatic pressure
 - Radioactive decay
 - Malasadas
- _____ 25. What determines the depth to which nitrate and phosphate are completely removed from the surface waters of the ocean?
- light penetration
 - upwelling
 - pressure
 - temperature
- _____ 26. If you cool seawater its density
- increases
 - decreases
 - stays the same
- _____ 27. The thermocline is the part of the ocean where
- the density changes rapidly
 - salinity changes rapidly
 - the temperature changes rapidly
 - you are most likely to find Elvis
- _____ 28. The SOFAR layer in the ocean is a region
- with maximum sound speed
 - with minimum sound speed
 - where submarines can hide from SONAR
 - where sound waves refract away from

- _____ 29. The colour of light that is absorbed least in the ocean is
- violet
 - blue
 - green
 - red
- _____ 30. The atmospheric pressure at the top of Mauna Kea is approximately
- 1000 mb
 - 829 mb
 - 562 mb
 - 213 mb
- _____ 31. The mass of one square inch of the atmosphere at the Earth's surface is approximately
- 5 pounds
 - 1 pound
 - 15 pounds
 - 25 pounds
 - 10 pounds
- _____ 32. Effective transport in the Ekman layer in the northern hemisphere relative to the wind is
- 20° to the left
 - 90° to the left
 - 15° to the right
 - 45° to the right
 - directly ahead
- _____ 33. Western boundary currents are:
- faster than eastern boundary currents
 - warmer than eastern boundary currents
 - all of the above
 - none of the above
- _____ 34. Southern oscillation is:
- a variation in the upwelling along the equator
 - a subsurface wave that travels along the thermocline
 - a variation in the pressure gradient between Tahiti and Darwin
 - a new dance
- _____ 35. During El Nino conditions the surface waters of the eastern Pacific are:
- colder than normal
 - warmer than normal
 - more productive than normal
 - drier than normal
- _____ 36. In the movie we saw in class, during the 1982/3 El Nino which area was affected by many typhoons?
- | | |
|---------------------|----------|
| a. Australia | c. India |
| b. French Polynesia | d. Japan |
- _____ 37. A wave behaves as a shallow water wave when the depth of the ocean is equal to or less than:
- one wavelength
 - 1/2 wavelength
 - 1/20 wavelength
 - 1/23 wavelength

- _____ 38. Typical tidal range in Hawaii is
- 12-15ft
 - 3-6 ft
 - 10-12ft
 - 20-25ft
- _____ 39. If a wind wave has a period of 8 seconds its velocity in meters per second in deep water would be approximately:
- 8
 - 12
 - 24
 - 210
- _____ 40. When wave trains propagate away from a storm they lose what percentage of their height each day?
- 10%
 - 50%
 - 30%
 - 22%
- _____ 41. The period of a wave is:
- the distance between its crests
 - the time it takes succeeding crests to pass a fixed point
 - the number of waves that pass a fixed point each second
 - the distance from the crest to the trough of a wave
- _____ 42. In the movie clip we saw in class, where were the very large waves?
- Cape Horn
 - Cabo san Lucas
 - Cape of Good Hope
 - South of Iceland
- _____ 43. In the Pacific Ocean, Tsunami travel at approximately:
- 13 mph
 - 45 mph
 - 150 mph
 - 450 mph
- _____ 44. The period of a typical Tsunami is:
- 30 seconds
 - 2 minutes
 - 15 minutes
 - 35 minutes
- _____ 45. The tides in Hawaii are:
- diurnal
 - semi-diurnal
 - mixed
- _____ 46. Each day high tide is approximately:
- 1 hour later
 - 1 hour earlier
 - 2 hours later
 - exactly the same time

- _____ 47. The current CO₂ content of the atmosphere (in ppmv) is about:
- 120
 - 180
 - 380
 - 560
- _____ 48. Relative to the atmosphere how much carbon dioxide is dissolved in the oceans:
- the same amount
 - one tenth
 - 70 times as much
 - 1000 times as much
- _____ 49. Data from ice-cores shows that when carbon dioxide levels in the atmosphere went down, average planetary temperatures:
- stayed the same
 - went up
 - went down
- _____ 50. The Vostock ice core was drilled by French and Soviet scientists in
- France
 - Greenland
 - Siberia
 - Antarctica
 - Alaska
- _____ 51. How long would it take to replace all the water in the oceans with river water?
- 36,000 years
 - 8 million years
 - 1000 years
 - 1 million years
 - 100 million years
- _____ 52. Hydrothermal fluids result from the reaction of sea water with high temperature magma below the bottom of the sea-floor. How deep can these fluids go:
- 10 m
 - 1 km
 - 5 km
 - 100km
- _____ 53. The thermohaline circulation is
- the process that moves deep water from the Atlantic to the Pacific Ocean
 - the process by which organisms remove chemicals in surface waters and remobilise them in deep water
 - the process which brings hydrothermal fluids to the sea floor
 - a new transport system at San Francisco airport
- _____ 54. Of the total water in the ocean the deep zone accounts for about
- 1%
 - 18%
 - 80%
 - 99.4%

Name: _____

ID: A

- _____ 55. The heat capacity of a substance is the amount of heat needed to raise its temperature by
- a. 1°C
 - b. 10°C
 - c. 15°C
 - d. 100°C
- _____ 56. The average speed of sound in water is
- a. 5 metres/second
 - b. 500 m/s
 - c. 1500 m/s
 - d. 3000 m/s
 - e. the same as in air
- _____ 57. At the equator the Earth is rotating eastward at approximately:
- a. 100 mph
 - b. 10,000 mph
 - c. 1,000 mph
 - d. 1,500 mph
- _____ 58. During the movie clip we watched in class about the Hokulea, what was the purpose of observing the directions of the waves in the surface ocean
- a. Predict the arrival of a nearby storm
 - b. Identify the presence of nearby islands
 - c. Maintain the direction of the canoe's travel
 - d. All of the above
- _____ 59. As a result of tides the length of a day on Earth is:
- a. increasing
 - b. decreasing
 - c. not changing
- _____ 60. The most recent measurements of sea level rise from satellites show sea level rising at:
- a. 40cm/100 yrs
 - b. 6 metres/100 yrs
 - c. 60 metres/100 yrs
 - d. 100 cm/100 yrs

Completion

Complete each statement.

61. The two forces that raise the tides on the surface of the Earth are _____ and _____

Name: _____

ID: A

Essay

62. Name 5 of the 6 major ions in seawater.

63. Draw a picture that shows what happens to 100 units of primary production in the ocean. Label the amounts of material at each depth in the ocean and sediments

64. Name the four factors that drive surface currents in the ocean